

AMENDMENT AND RESPONSE UNDER 37 CFR § 1.111

Serial Number: 10/674,960

Filing Date: September 30, 2003

Title: METHODS FOR LASER SCRIBING WAFERS

Assignee: Intel Corporation

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Dkt: 884.949US1 (INTEL)

FORMAL DRAWINGS

Enclosed are Formal Drawings.

REMARKS

This responds to the Office Action mailed on November 28, 2005. By this response, no claims are amended, canceled, or added. As a result, claims 16-21, 23-27 and 29-38 remain pending in this application. Reconsideration of the application is requested in view of the following remarks is requested.

Objections to the Specification

A. Objection: The Examiner objected to the disclosure because of the following informalities:

Page 1, line 22, "tested an sorted" is not idiomatic language. (see highlighted area below)

Page 6, line 27, "gray shown in Fig. 6" should be --gray shown in Fig. 5—

B. Response: The paragraph starting at page 1, line 22 has been amended to include the phrase "tested and sorted". The correction changing the reference from Fig. 6 to Fig. 5 was also made. The objections should now be overcome as a result of these corrections.

§102/ §103 Rejection of the Claims

A. Rejection: Claims 29-31 were rejected under 35 USC § 102(a & b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over any of JP 411284278 A (Toshiba Corp) or Manor (U.S. 6,420,245) or Peng et al. (U.S. 6,737,606).

B. Response: A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *M.P.E.P.* § 2131. To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter. *PPG Industries, Inc. V. Guardian Industries Corp.*, 75 F.3d 1558, 37 USPQ2d 1618 (Fed. Cir. 1996). The identical

invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 29 recites "...a microprocessor for controlling the direction of the laser energy and controlling the movement of the saw..." and "...memory including an instruction set to cause a suitably programmed apparatus to laser scribe a first continuous line on a wafer; and laser scribe an area near the first continuous line but not contacting the first continuous line." None of the references appears to teach an instruction set to cause the laser to scribe a first continuous line on a wafer and laser scribe an area near the first continuous line. The JP 411284278 A (Toshiba Corp) reference discloses "...forming multiple cleavage grooves M in point form at specified intervals and in a straight line..." and then "...cutting the LD bars along the cleavage grooves by inserting the cutting edge in the cleavage grooves formed by the scriber 23." (see abstract of JP 411284278 A). There is no laser scribing near the first laser scribing. As a result, the JP 411284278 A (Toshiba Corp) reference either fails to disclose forming the first continuous line, or fails to disclose laser scribing an area near the first continuous line but not contacting the first continuous line. Regardless of the position taken, one of the laser scribings is not disclosed in the JP 411284278 A (Toshiba Corp) reference. As a result, the Examiner fails to make out a proper *prima facie* case of anticipation since the JP 411284278 A (Toshiba Corp) reference fails to disclose each and every element as set forth in the claim.

The Manor reference also fails to disclose an instruction set to cause a suitably programmed apparatus to laser scribe a first continuous line on a wafer; and laser scribe an area near the first continuous line but not contacting the first continuous line. In the Manor reference, one scribe line is made and then a saw is passed "along the scribe lines...to singulate a wafer." (See abstract of Manor). There is no laser scribe of an area near the first continuous line taught in the Manor reference. It should be noted that Manor's teaching of plural laser scribe lines is merely following the same procedure with a plurality of laser beams across the surface of the workpiece. Furthermore, there is no disclosure of a microprocessor or of an instruction set as recited in the claim. An electronic search was conducted on the patent at the USPTO's website and nothing was found for the terms "processor", "microprocessor" or "instruction". As a result, the Examiner fails to make out a proper *prima facie* case of anticipation since the Manor (U.S. 6,420,245) reference fails to disclose each and every element as set forth in the claim.

The Peng et al. reference also fails to disclose an instruction set to cause a suitably programmed apparatus to laser scribe a first continuous line on a wafer; and laser scribe an area near the first continuous line but not contacting the first continuous line. The Peng reference discloses "...a two-pass cutting procedure. The first pass is made by a laser, which scribes the workpiece. The second pass is made by the mechanical cutter." (See abstract of Peng et al.) There is no laser scribe of an area near the first continuous line taught in the Peng et al. reference. As a result, the Examiner fails to make out a proper *prima facie* case of anticipation since the Peng et al. (U.S. 6,737,606) reference fails to disclose each and every element as set forth in the claim.

As a result, none of the JP 411284278 A (Toshiba Corp) or the Manor (U.S. 6,420,245) or the Peng et al. (U.S. 6,737,606) references anticipate claim 29. Claims 30 and 31 depend from claim 29 and include the recitation of claim 29 by their dependency. As a result, none of the JP 411284278 A (Toshiba Corp) or the Manor (U.S. 6,420,245) or the Peng et al. (U.S. 6,737,606) references anticipate claims 30 and 31.

In order for the Examiner to establish a *prima facie* case of obviousness, three base criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference or references must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *M.P.E.P.* § 2142 (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir. 1991)).

None of the JP 411284278 A (Toshiba Corp) or the Manor (U.S. 6,420,245) or the Peng et al. (U.S. 6,737,606) references, standing alone, can be said to make a proper *prima facie* case of obviousness with respect to claims 29-31 since each fails to teach or suggest all the claim limitations. Each teaches laser scribing a single scribe line and then cutting along the scribe line formed. There is no teaching or suggestion of laser scribing anything near the first laser scribed line.

The Examiner's 35 U.S.C. 103(a) as obvious over any of JP 411284278 A (Toshiba Corp) or Manor (U.S. 6,420,245) or Peng et al. (U.S. 6,737,606) is also a series of rejections of claims 29-31 based solely on a single reference (either JP 411284278 A, or Manor, or Peng et al.) Applicant respectfully traverses the single reference rejection under 35 U.S.C. § 103(a) since not all of the recited elements of the claims are found in the any one reference. Since all the elements of the claim are not found in any one reference, Applicant requests that the Examiner cite a reference that includes laser scribing a first continuous line, and laser scribing an area near the first continuous line. In the alternative, Applicant requests that the Examiner place an affidavit of personal knowledge in the file for any elements the Examiner has failed to produce in any of the references (either JP 411284278 A, or Manor, or Peng et al.) clearly showing an element or elements. Still another alternative is that the Examiner indicates any taking official notice of the missing elements. Applicant respectfully objects to the reason set forth for obviousness set forth in the Office Action November 28, 2005 or to any taking of official notice with a single reference obviousness rejection and, pursuant to M.P.E.P. § 2144.03.

As a result of the above remarks, the Examiner's rejection of claims 29-31 under 35 USC § 102(a & b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over any of JP 411284278 A (Toshiba Corp) or Manor (U.S. 6,420,245) or Peng et al. (U.S. 6,737,606) is overcome.

C. Rejection: Claims 16-21, 23-27, and 32-38 were rejected under 35 USC § 102(a) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over any of JP355046579A (Toshiba Corp) in view of JP353002074A (NEC Home Electronics LTD) and in view of Boyle et al. (U.S. 6,586,707).

D. Response: A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *M.P.E.P. § 2131*. To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter. *PPG Industries, Inc. V. Guardian Industries Corp.*, 75 F.3d 1558, 37 USPQ2d 1618 (Fed. Cir. 1996). The identical

invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 16 recites "...laser scribing a first continuous line; laser scribing a second continuous line spaced apart from the first continuous line; and laser scribing a third continuous line, the third continuous line positioned between the first continuous line and the second continuous line." None of the references appears to teach laser scribing a first continuous line and a second continuous line, and laser scribing a third continuous line between the first and second line. The JP 411284278 A (Toshiba Corp) reference discloses "...forming multiple cleavage grooves M in point form at specified intervals and in a straight line..." and then "...cutting the LD bars along the cleavage grooves by inserting the cutting edge in the cleavage grooves formed by the scribe 23." (see abstract of JP 411284278 A). There is no laser scribing of a third continuous line positioned between the first and second lines in the JP 411284278 A (Toshiba Corp) reference. As a result, the Examiner fails to make out a proper *prima facie* case of anticipation since the JP 411284278 A (Toshiba Corp) reference fails to disclose each and every element as set forth in the claim.

The JP 353002074A (NEC Home Electronics LTD) reference describes a first laser scribing and then a second laser scribing. It appears that the first scribing passes through the glass film and the second scribing is over the first scribe line or in the ditch formed by the first scribe line as the silicon (Si) of a wafer is then scribed. There is no teaching of laser scribing of a third continuous line positioned between the first and second lines in the JP 353002074A (NEC Home Electronics LTD). As a result, the Examiner fails to make out a proper *prima facie* case of anticipation since the JP 353002074A (NEC Home Electronics LTD) reference fails to disclose each and every element as set forth in the claim.

The Boyle et al. reference also fails to teach laser scribing a first continuous line and a laser scribing a second continuous line, and laser scribing a third continuous line between the first and second line. There is no mention of scribing or laser scribing in the Boyle et al. reference. A computer search of the Boyle et al. reference on the USPTO's website revealed no mention of the terms "scribe", or "scribing". The patterns shown in the Boyle et al. reference are for laser machining which requires the removal of much more material than merely laser scribing a line on a wafer. As a result, the Examiner fails to make out a proper *prima facie* case

of anticipation since the Boyle et al. reference fails to disclose each and every element as set forth in the claim.

As a result, claim 16 is not anticipated by any of the JP355046579A (Toshiba Corp) or JP353002074A (NEC Home Electronics LTD) or Boyle et al. (U.S. 6,586,707) references since none of these references discloses each and every element as set forth in the claim.

Claims 17-21 each depend from claim 16 and include the limitations of claim 16 by their dependency. As a result, claims 17-21 are not anticipated by any of the JP355046579A (Toshiba Corp) or JP353002074A (NEC Home Electronics LTD) or Boyle et al. (U.S. 6,586,707) references since none of these references discloses each and every element as set forth in the claims 17-21.

Claim 23 recites "...laser scribing a first continuous line; laser scribing a second continuous line spaced apart from the first continuous line; laser scribing a third continuous line, the third continuous line positioned between the first continuous line and the second continuous line..." This is substantially the same set of limitations as found in claim 16. It is respectfully submitted that claim 23 is not anticipated by any of the JP355046579A (Toshiba Corp) or JP353002074A (NEC Home Electronics LTD) or Boyle et al. (U.S. 6,586,707) references for the same reasons set forth above with respect to claim 16. It should also be pointed out that claim 23 further includes the limitation to "...passing a saw through the area of the first continuous line, the second continuous line and the third continuous line to cut the wafer."

Claims 24-27 each depend from claim 23 and include the limitations of claim 16 by their dependency. As a result, claims 24-27 are not anticipated by any of the JP355046579A (Toshiba Corp) or JP353002074A (NEC Home Electronics LTD) or Boyle et al. (U.S. 6,586,707) references since none of these references discloses each and every element as set forth in the claims 24-27.

Claim 32 recites "...laser treating a first area of the wafer; laser treating a second area adjacent the first area; and laser scribing a third continuous line, the third continuous line positioned between the first area and the second area." The JP355046579A (Toshiba Corp) reference teaches only forming one scribe line. There is no teaching of laser treating a first area or laser treating a second area. The JP353002074A (NEC Home Electronics LTD) teaches two

scribing lines over the same area. There is no laser treating a first area and a second area. The Boyle et al. (U.S. 6,586,707) reference does not teach scribing or laser scribing. Therefore, the Examiner fails to make out a proper *prima facie* case of anticipation with respect to claim 32 since none of JP355046579A (Toshiba Corp), or JP 353002074A (NEC Home Electronics LTD), or Boyle et al. (U.S. 6,586,707) disclose each and every element as set forth in the claim.

Claims 33-38 each depend from claim 32 and include the limitations of claim 32 by their dependency. As a result, claims 33-38 are not anticipated by any of the JP355046579A (Toshiba Corp) or JP353002074A (NEC Home Electronics LTD) or Boyle et al. (U.S. 6,586,707) references since none of these references discloses each and every element as set forth in the claims 33-38.

In order for the Examiner to establish a *prima facie* case of obviousness, three base criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference or references must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *M.P.E.P.* § 2142 (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir. 1991)).

Claim 16 is not obvious in view of the combination of JP355046579A (Toshiba Corp) in view of JP353002074A (NEC Home Electronics LTD) and in view of Boyle et al. (U.S. 6,586,707) since the combination of the references fails to teach or suggest all the claim limitations. As noted above, none of the references teaches or suggests scribing three lines as recited in the claim. Combining all the references does not cure this shortcoming.

The Boyle et al. reference also fails to deal with laser scribing but rather teaches laser machining which requires removal of much more material than laser scribing three lines. As a result, claim 16 is not obvious in view of the art cited. Furthermore, claims 17-21, which depend from claim 16, are not obvious in view of the art cited.

Claim 23 includes substantially the same recitation as claim 16 and therefore is also not obvious. In addition, claim 23 recites "...passing a saw through the area of the first continuous

line, the second continues line and the third continuous line to cut the wafer.” The Boyle et al. reference teaches away from the use of saws (see column 1, lines 11-18). This teaching away is another reason against combining the references. As a result, claim 23 is not obvious in view of the art cited. Furthermore, claims 24-27, which depend from claim 23, are not obvious in view of the art cited.

Claim 32 recites “...laser treating a first area of the wafer; laser treating a second area adjacent the first area; and laser scribing a third continuous line, the third continuous line positioned between the first area and the second area.” The JP355046579A (Toshiba Corp) reference teaches only forming one scribe line. There is no teaching of laser treating a first area or laser treating a second area. The JP353002074A (NEC Home Electronics LTD) teaches two scribing lines over the same area. There is no laser treating a first area and a second area. The Boyle et al. (U.S. 6,586,707) reference does not teach scribing or laser scribing. The Boyle et al. reference teaches laser machining. One of ordinary skill in the art would not combine either or both of the JP355046579A (Toshiba Corp) reference and the JP353002074A (NEC Home Electronics LTD) since the laser machining of Boyle would obliterate any laser scribing. Therefore, the combination would have no reasonable expectation of success. As a result, claim 32 is not obvious in view of the combination of JP355046579A (Toshiba Corp) in view of JP353002074A (NEC Home Electronics LTD) and in view of Boyle et al. (U.S. 6,586,707). Claims 33-38 also would not be obvious in view of the combination of JP355046579A (Toshiba Corp) in view of JP353002074A (NEC Home Electronics LTD) and in view of Boyle et al. (U.S. 6,586,707) since these claims include the recitations of claim 32 by their dependency.

Therefore, for all the reasons set forth above with respect to claims 16-21, 23-27, and 32-38, the Examiner’s rejection under 35 USC § 102(a) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over any of JP355046579A (Toshiba Corp) in view of JP353002074A (NEC Home Electronics LTD) and in view of Boyle et al. (U.S. 6,586,707) is overcome.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney ((612) 373-6977) to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: MS Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 28th day of February, 2006.

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